## The invention claimed is:

- 1. A process for removal of sulfur from a full boiling range fluid cracked naphtha stream comprising the steps of:
- (a) feeding hydrogen and a full boiling range naphtha feed containing olefins, diolefins, mercaptans, thiophene and other organic sulfur compounds to a
  - (b) concurrently in said first distillation column reactor
- (i) reacting a portion of the mercaptans contained within said full boiling range naphtha stream with a portion of the diolefins contained within said full boiling range naphtha stream to produce sulfides and
- (ii) separating said full boiling range naphtha stream into three fractions by fractional distillation;
- (c) removing a first liquid product from said first distillation column reactor comprising a light naphtha containing substantially no mercaptans, sulfides or other organic sulfur compounds as a first overheads;
- (d) removing an intermediate naphtha as a side draw from said distillation column reactor containing thiophene, diolefins boiling in the range of thiophene and mercaptans boiling in the range of thiophene;
- (e) removing a heavy naphtha from said first distillation column reactor containing said sulfides and other organic sulfur compounds as a first bottoms;
- (f) feeding said intermediate naphtha and a low sulfur, low olefin gas oil to a single pass fixed bed reactor containing a hydrodesulfurization catalyst where substantially all of any remaining sulfides and other organic sulfur compounds are reacted with hydrogen to form hydrogen sulfide.
- 2. A process for removal of sulfur from a full boiling range fluid cracked naphtha stream comprising the steps of:
- (a) feeding hydrogen and a full boiling range naphtha feed containing olefins, diolefins, mercaptans, thiophene and other organic sulfur compounds to a first distillation column reactor containing a bed of thioetherification catalyst;
  - (b) concurrently in said first distillation column reactor
- (i) reacting a portion of the mercaptans contained within said full boiling range naphtha stream with a portion of the diolefins contained within said full boiling range naphtha stream to produce sulfides and

- (ii) separating said full boiling range naphtha stream into three fractions by fractional distillation;
- (c) removing a first liquid product from said first distillation column reactor comprising a light naphtha containing substantially no mercaptans, sulfides or other organic sulfur compounds as a first overheads;
- (d) removing an intermediate naphtha as a side draw from said distillation column reactor containing thiophene, diolefins boiling in the range of thiophene and mercaptans boiling in the range of thiophene;
- (e) removing a heavy naphtha from said first distillation column reactor containing said sulfides and other organic sulfur compounds as a first bottoms;
- (f) feeding said intermediate stream and hydrogen to a distillation column where a portion of said intermediate stream is taken as overheads and returned to said distillation column reactor; and
- (g) feeding the bottoms from said distillation column and a low sulfur, low olefin gas oil to a single pass fixed bed reactor containing a hydrodesulfurization catalyst where substantially all of any remaining sulfides and other organic sulfur compounds are reacted with hydrogen to form hydrogen sulfide.
- 3. A process for removal of sulfur from a full boiling range fluid cracked naphtha stream comprising the steps of:
- (a) feeding hydrogen and a full boiling range naphtha feed containing olefins, diolefins, mercaptans, thiophene and other organic sulfur compounds to a first distillation column reactor containing a bed of thioetherification catalyst;
  - (b) concurrently in said first distillation column reactor
- (i) reacting a portion of the mercaptans contained within said full boiling range naphtha stream with a portion of the diolefins contained within said full boiling range naphtha stream to produce sulfides and
- (ii) separating said full boiling range naphtha stream into three fractions by fractional distillation;
- (c) removing a first liquid product from said first distillation column reactor comprising a light naphtha containing substantially no mercaptans, sulfides or other organic sulfur compounds as a first overheads;

- (d) removing an intermediate naphtha as a side draw from said distillation column reactor containing thiophene, diolefins boiling in the range of thiophene and mercaptans boiling in the range of thiophene;
- (e) removing a heavy naphtha from said first distillation column reactor containing said sulfides and other organic sulfur compounds as a first bottoms;
- (f) feeding said intermediate stream and hydrogen to a second distillation column reactor containing a hydrogenation catalyst; and
- (g) feeding the bottoms from said second distillation column reactor and a low suffur, low olefin gas oil to a single pass fixed bed reactor containing a hydrodesulfurization catalyst where substantially all of any remaining sulfides and other organic sulfur compounds are reacted with hydrogen to form hydrogen sulfide.
- 4. The process according to claim 3 wherein the effluent from single pass fixed bed reactor is fed to a vessel wherein the H<sub>2</sub>S is removed as a vapor to form a third liquid product.
- 5. The process according to claim 3 wherein said thioetherification catalyst comprises palladium supported on an alumina base.
- 6. The process according to claim 3 wherein said hydrodesulfurization catalyst comprises the oxides of a Group VIB or Group VIII supported on an alumina base.
- 7. The process according to claim 6 wherein said catalyst comprises the oxides of cobalt and molybdenum supported on an alumina base.
- 8. The process according to claim 6 wherein said catalyst comprises the oxides of nickel and molybdenum supported on an alumina base.
- 9. The process according to claim 6 wherein said catalyst comprises the oxides of nickel and tungsten supported on an alumina base.
- 10. The process according to claim 7 wherein said oxides are converted to sulfides prior to feeding said full boiling range naphtha feed.
- 11. A process for removal of sulfur from a full boiling range fluid cracked naphtha stream comprising the steps of:
  - (a) feeding hydrogen and a full boiling range naphtha feed containing

olefins, diolefins, mercaptans, thiophene and other organic sulfur compounds to a first distillation column reactor containing at least one bed of thioetherification catalyst and at least one bed of hydrogenation catalyst;

- (b) concurrently in said first distillation column reactor
- (i) reacting a portion of the mercaptans contained within said full boiling range naphtha stream with a portion of the diolefins contained within said full boiling range naphtha stream to produce sulfides in said bed of thioetherification catalyst,
- (ii) reacting a portion of the diolefins contained with said full boiling range naphtha stream with hydrogen in said bed of hydrogenation catalyst to selectively hydrogenate said diolefins to mono olefins, and
- (ii) separating said full boiling range naphtha stream into three fractions by fractional distillation;
- (c) removing a first liquid product from said first distillation column reactor comprising a light naphtha containing substantially no mercaptans, sulfides or other organic sulfur compounds as a first overheads;
- (d) removing an intermediate naphtha as a side draw from said distillation column reactor containing thiophene, diolefins boiling in the range of thiophene and mercaptans boiling in the range of thiophene;
- (e) removing a heavy naphtha from said first distillation column reactor containing said sulfides and other organic sulfur compounds as a first bottoms;
  - (f) treating said first bottoms to remove organic sulfur compounds;
- (g) feeding said intermediate stream and hydrogen to a second distillation column reactor containing a hydrogenation catalyst;
  - (h) concurrently in said second distillation column reactor:
- (i) reacting a portion of the diolefins contained within said intermediate stream with hydrogen to selectively hydrogenate said diolefins and
- (ii) separating said intermediate stream into a second overheads and second bottoms by fractional distillation;
  - (i) returning said second overheads to said first distillation column reactor;
- (j) feeding said second bottoms, a low sulfur gas oil and hydrogen to a single pass fixed bed reactor containing a hydrodesulfurization catalyst where

substantially all of the thiophenes contained within said second bottoms are reacted with hydrogen to form hydrogen sulfide;

- 12. The process according to claim 11 comprising:
- (k) feeding the effluent to a distillation column wherein said second bottoms are separated as a second side stream from said hydrogen sulfide which is removed as a third overheads and said low sulfur gas oil which is removed as a third bottoms:
- (I) feeding said second side stream from to a vessel wherein the  $\rm H_2S$  is removed as a vapor which is returned to said distillation column; and
  - (m) recycling said third bottoms to said single pass fixed bed reactor.